THE SECRETARY OF COMMERCE
Washington, D.C. 20230

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MEMORANDUM FOR MEMBERS OF THE CABINET COUNCIL ON COMMERCE AND TRADE (CCCT)

FROM: Malcolm Baldrige, Chairman Pro Tempore
Cabinet Council on Commerce and Trade

SUBJECT: Continuity of Landsat Data

I. ISSUE

Should the Administration purchase an additional Landsat?

II. BACKGROUND

President Reagan announced on March 8, 1983, the Administration's intent to seek transfer of the Nation's civil land and weather satellites to the private sector. The transfer is contingent upon protecting U.S. national security and foreign policy interests, and securing a favorable business proposition for the taxpayer.

When the preparatory work leading to the President's decision was completed, the Landsat-4 satellite had been successfully launched and was fully operational. A follow-on satellite, called Landsat-D', was nearing completion.

It was expected that Landsat-4 would operate until approximately July 1985, and be replaced by Landsat-D' to continue service until approximately July 1988. This would have permitted a reasonably smooth transition to a private sector system, because a selection of a private entity in 1984 would have preceded by four years the failure of Landsat-D'. Four to five years is a brisk, but acceptable, period for the production of a modern space system.

The smooth transition is no longer possible because of the imminent failure of Landsat-4. Three major subsystems have fully or partially failed and the best available estimate shows that the satellite will fail completely within a few months. Enclosure 1 describes the status of Landsat-4.

Preparations are under way to launch Landsat-D' sooner, possibly as early as the spring of 1984. If the launch is successful, service should be available until the spring of 1987. This will lead to a data gap from Landsat-4 class systems for approximately eighteen months after the demise of Landsat-D'. Alternatively, the gap at the end of life could be replaced by delaying the launch of Landsat-D' and increasing the gap in 1984 and 1985.

This option is not addressed below because it adds storage costs to the approximately $25 million that will be required to launch Landsat-D', and undermines the already modest market for Landsat data.

The above considerations lead to the question whether a service gap seriously affects data users or the private sector transfer process, and whether a follow-on Landsat should be purchased to avoid the gap. Because schedules and dates play an important role in the succeeding discussion, Enclosure 2 lists the major milestones and their dates.

III. DISCUSSION

Significant current users of Landsat data include the Department of Agriculture, national security agencies, the academic community, the private sector, and a variety of international users. The total Federal Landsat data purchase for fiscal year 1983 is expected to be approximately $7 million. The combined foreign ground station access fees and sales, plus the remaining U.S. over-the-counter sales, were expected to equal another $8 million. This latter number may have to be revised downward because of the condition of Landsat-4. The year-to-date total for all Landsat revenues is nominally $10 million. It should be noted that this figure does not reflect secondary or tertiary uses of the data, where most believe the true economic value of Landsat lies.

Current uses of Landsat data, many of which are still largely in a research status, include contributing to crop production estimates, assessments of vegetation condition, mineral exploration, water resource estimation, and land use planning.

The new sensor flown on Landsat-4, the Thematic Mapper, has produced significant results in all of the above areas. It has also produced results suggesting new applicatons as well. The Multispectral Scanner on Landsat-4 is essentially the same instrument flown on the earlier Landsats.

The ultimate economic value and operational utility of Landsat remain uncertain, but each succeeding Landsat has produced increasingly encouraging results, even though no major rush of private investment has occurred.

The private sector transfer of the civil satellites is proceeding. A request for proposals is planned for November of this year. Vendor selection is scheduled for May 1984.

If a satisfactory arrangement is found with private industry, and legislation is passed by Congress, a firm could place an order for a commercial Landsat as early as October 1984. Service could then begin in October 1988 or somewhat later. This schedule leads to the eighteen-month data gap mentioned above.

It could also be determined in May 1984 that no proposition is satisfactory. Although it is not current policy to assure Landsat data continuity, if it were then determined that Landsat data should continue through Government operation of at least the space segment, procurement of a follow-on Landsat could begin at that time. Depending on the extent of changes to the current design, service could begin in 1989 or 1990. This leads to an even longer data gap.

The interruption of Landsat-4 class data must be considered against the potential availability of data from the French SPOT system and the satellite planned by American Science and Technology (AS&T). The French are planning to launch their satellite in early 1985. AS&T has not established a firm date, but it appears certain to be later than the French system. Both systems are considerably different from Landsat-4.

AS&T proposes to launch a system that is largely an extension of Multispectral Scanner technology. The initial sensor will have two visible and two infrared bands, with a spatial resolution of 80 meters. For comparison purposes, the Thematic Mapper on Landsat-4 has seven bands and provides a spatial resolution of 30 meters in the visible and near infrared. The AS&T system lacks the middle and far infrared bands that are of interest to the geological community. Landsat-D' will provide service to that community during its lifetime.

The French SPOT system is complementary to the Landsat-4 system. It has somewhat better spatial resolution in the multispectral mode (20 meters instead of 30 meters). It also has a higher resolution (10 meters) panchromatic mode and an offset pointing and stereo capability. It shares largely the spectral limitations of the American Science and Technology system. It is, therefore, not a direct replacement for Landsat-4.

Last year the National Security Council staff disapproved an agency's request to obtain sample SPOT data on the basis that it would lend support to a foreign system. While no general policy has been developed, restrictions on the use of data from a foreign system could suggest the need for continuing support for a U.S. system. Further, there is a related open issue as to whether the U.S. should rely on a foreign system for earth resources data.

The conclusion of the above is that a data gap after Landsat-D' and before fruition of the commercialization activities may be filled by reliance on a small and unproven U.S. company, or by accepting reliance on a foreign supplier--assuming in the latter instance that any policy issues are resolved satisfactorily.

Alternatively, a data gap could be minimized by the purchase of an additional Landsat. The total cost, including launch, of a Landsat of the current design is approximately $300 million. The

fraction of the cost that would be required in fiscal year 1984 is approximately $65 million. On the assumption that work could begin in the spring of 1984, launch could occur in the spring of 1988. This still leaves a data gap, but reduces it by six months or possibly more. It also produces a system more likely to sustain the availability of data during the transfer process, but increases the Federal investment that would be subject to some cost recoupment formula during the transfer process.

IV. OPTIONS

There are two options: (1) Procure a follow-on Landsat. (2) Do not procure a follow-on Landsat and accept either a data gap or reliance upon the AS&T or SPOT systems.

OPTION 1 - Procure a follow-on Landsat.

Pros:

1. Minimizes data gap from Landsat-4 class systems after the demise of Landsat-D'.

2. Assists current market development by providing increased confidence in data availability.

3. Eliminates U.S. need to rely upon a foreign system or an unproven U.S. venture for data.

Cons:

1. Increases Federal budget, and no agency has agreed to allocate funds within its outyear guidelines.

2. Increases purchase cost of the system to the private sector, if cost recoupment is sought.

3. Gives appearance of a reluctance on the part of the Government to get out of the Landsat business.

4. Will create a Government competitor to firms such as AS&T that could dissuade their investors from continued participation in the venture.

OPTION 2 - Do not procure a follow-on Landsat.

Pros:

1. Requires no addition to Federal budget.

2. Demonstrates U.S. intent to establish a private sector presence in space remote sensing.

3. Minimizes the amount of capital equipment to be transferred.

4. Places greatest reliance upon the private sector and the marketplace in defining the system characteristics for the satellite that will follow Landsat-D'.

Cons:

1. May make the U.S. reliant upon a French system for earth resources data.

2. Produces greatest data gap for Landsat-4 class systems.

3. Produces less assurance of data availability to the value-added industry.

4. Current system is subject to complete failure in the event Landsat-D' is not successfully launched or does not last a full three years.

V. RECOMMENDATION

In meetings of the CCCT working group on Landsat, OMB, USDA, Interior and State favored Option 2. NASA, NSC, CIA, and Defense were undecided. The Department of Commerce supports Option 1.

STATUS OF LANDSAT-4

The newest of the U.S. earth resources satellites, Landsat-4, was launched in July 1982. Although the satellite has provided spectacular new views of the Earth, it has experienced a series of major system failures. This is a frequent occurrence in the first satellite of a new series.

Three major subsystems have experienced failures: (1) the central control unit which channels upcoming commands to the proper destination on the satellite, (2) the X-band transmitter which provides satellite-to-ground transmission of high resolution data from the Thematic Mapper, and (3) the solar array cable which connects to the power processing module.

The failure of the central control unit has left the satellite with a possibility of complete failure at any time. Operation continues on a redundant system, but should it fail there would be no way to control the satellite.

The X-band transmitter has interrupted the flow of Thematic Mapper data. This prevents the transmission of high-resolution data to foreign ground stations, and prevents the collection of all foreign data at the 30-meter resolution level. When the Tracking and Data Relay Satellite System (TDRSS) completes its checkout, collection of high-resolution data can resume through that channel. Unfortunately, the TDRSS will be heavily loaded in August and September with preparations and conduct of the STS-8 and STS-9 missions and may be unable to provide service to Landsat before the third subsystem failure brings the mission to a close.

There are four panels which make up the solar array on Landsat-4. The wires connecting two of those panels to the satellite's power supply have broken, and the satellite is operating on half power. The wires break because of a design error in the cable assembly and the nature of that error makes it inevitable that a third panel will fail soon. That failure will end the mission. The best engineering judgment is that the failure will occur this Fall, and October is being used as a planning date.

Enclosure 2

PROJECTED SCHEDULE OF EVENTS

	Present Satellites (Landsat-4 & -D')	Private Sector and Foreign	Landsat Follow-on (D")
Failure of Landsat-4	10/83		
Release of Commercialization Solicitation		11/83	
Receipt of Commercialization Proposals			
Earliest Launch of Landsat-D' and Start on Landsat-D"	3/84		3/84
Decision on Commercialization Proposals		5/84	
Earliest Start on Commercial Satellite Resulting from Solicitation		10/84	
Launch of French SPOT Satellite		1/85	
Speculative AS&T Launch Date		1/86	
End of Life for Landsat-D'		3/87	
Launch of Landsat-D"			3/88
Earliest Launch of Commercial Satellite Resulting from Solicitation		10/88	